Explosion

Description

HH is the president of ACM kingdom. The territory of ACM kingdom is exactly a square. It can be represented as two-dimensional plane occupying $[-10^4, 10^4] \times [-10^4, 10^4]$. There are N buildings in the ACM kingdom each located on (x_i, y_i).

One day, HH receives a message from terrorist. In the message, the terrorist claims that they have set a bomb in the territory of ACM kingdom. Since there is no other clue about this terrorist events. HH needs to first estimate the damage the bomb would cause.

Thus, HH assumes that the terrorist will select a position in the territory of ACM kingdom uniformly randomly. Also, HH assumes that the bomb would affect all the building within the euclidean distance of R. HH wants to know what's probability that there are exactly d buildings being affected for several chosen d.

As the most talented information scientist in the ACM kingdom, you are chosen to help HH find out the probability.

Input

The first line contains an integer T indicating the total number of test cases.

For each test case, the first line contains two space separated integers N, R indicating the number of buildings, and the bomb will affect all the building within the distance of R. Following N lines each contains two space separated integer x_i, y_i indicating that i-th building locates at (x_i, y_i). Next following line contains an integer Q indicating that HH wants to know the probability of Q different number of buildings. Following Q lines each contains an integer d_i indicating that HH wants to know the probability that there are exactly d_i buildings affected.

- $1 \leq N \leq 500$
- $1 \leq \sum N \leq 3000$
- $1 \leq R \leq 5000$
- $-5000 \leq x_i, y_i \leq 5000$
- $1 \leq Q \leq N + 1$
- $0 \leq d_i \leq N$

Output

For each query, output the probability p_i in one line. Your answer will be considered correct if the absolute error or relative error is at most 10^{-7}.

Sample Input

```
2
1 5000
0 0
2
0
1
2 1000
0 500
0 -500
3
0
1
2
```

Sample Output

```
0.803650459
0.196349541
0.987362961
0.009566115
0.003070924
```